

L 39731-66 EMT(m)/EMP(t)/ETI IJP(c) JD/GD-2

ACC NR: AP6007338

SOURCE CODE: UR/0292/66/000/002/0008/0010

AUTHOR: Al'tman, A. B. (Candidate of technical sciences); Gladyshev, P. A.
(Candidate of technical sciences); Rastanayev, I. D. (Engineer)

ORG: none

TITLE: Metal-ceramic materials for magnetic wedges in electrical machinery

SOURCE: Elektrotehnika, no. 2, 1966, 8-10

TOPIC TAGS: metal ceramic material, electric machine

ABSTRACT: An investigation of Fe-Al and Fe-Si metal-ceramic alloys carried out in VNIEM is briefly reported. Pressed and sintered in the mold, magnetic wedges of these compositions were tested: 12% Al - 88% Fe, 16% Al - 84% Fe, 18% Al - 82% Fe, 4% Si - 96% Fe, 6.5% Si - 93.5% Fe; fields of 0.5-100 oe were applied. Magnetic and mechanical characteristics for the above compositions

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UDC: 621.313.002.2

ACCESSION NR: AP4029209

S/0226/64/000/002/0074/0079

AUTHOR: Al'tman, A. B.; Gladyshev, P. A.; Rastanayev, I. D.

TITLE: Investigation of magneto-soft metal powder alloys Fe-Al, Fe-Si, and Fe-Si--Al

SOURCE: Poroshkovaya metallurgiya, no. 2, 1964, 74-79

TOPIC TAGS: iron based alloy, aluminum containing alloy, silicon containing alloy, powder metal alloy, magneto-soft alloy

ABSTRACT: Magneto-soft metal powder materials are presently used on d-c installations and utilize whole-pressed metal powder magnetic circuits made from iron and iron alloys with silicon. The use of such magnetic circuits in a-c installations is difficult because of significant specific loss. The authors found that metal powder technology has evolved to the point that whole-pressed magnetic circuits can be prepared and used in a-c installations of 50 cps. Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: VNIIElektromekhaniki

Card 1/1

Sub: 13 Feb 63

FEDOROV, G.B.; ZHOMOV, F.I.; Prinimal uchastiye: RASTANAYEV, I.D., inzh.

Diffusive penetration of uranium into molybdenum from a uranium-niobium-zirconium alloy. Met. i metalloved. chist. met. no. 4: 64-68 '63. (MIRA 17:5)

GARBAR, Mikhail Ivanovich; RASTANIN, Iven Vasil'vevich; KAMENSKIY, I.V.,
kand.khim.nauk, nauchnyy red.; GOMOZOVA, N.A., red.; TEMIINA,
Ye.L., tekhn.red.

[Plastics and synthetic resins in construction] Plastmassy i
sinteticheskie smoly v stroitel'stve. Moskva, Gos.izd-vo lit-ry
po stroit., arkhitekt. i stroit.materialam, 1960. 262 p.

(MIRA 13:11)

(Plastics)

(Resins, Synthetic)

Plastics and Synthetic Resins (Cont.)

SOV/4965

statistical data presented. No personalities are mentioned.
No references are given.

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S/191/62/000/003/002/010
B101/B147

AUTHORS: Rastanin, I. V., Kupriyanov, N. V., Chirimanov, P. A.,
Zolotova, O. P., Gracheva, T. A.

TITLE: Production of indene cumarone resins from products of
petroleum pyrolysis

PERIODICAL: Plasticheskiye massy, no. 3, 1962, 3-5

TEXT: On suggestion of the Gosstroy (Gosstroy USSR), research was carried
cut in 1959-60 for production of indene cumarone resins (ICR) from petroleum
by the Vostochnyy uglekhimicheskiy institut (Eastern Institute of Coal
Chemistry), Sverdlovsk, the zavod "Neftegaz" ("Neftegaz" Plant) Gor'kiy,
and the Institut neftekhimicheskikh protsessov AN AzerbSSR (Institute of
Petrochemical Processes AS Azerbaydzhanskaya SSR), Baku. The present paper
gives results obtained by the "Neftegaz" Plant. Light oil from petroleum
pyrolysis was found to be the best initial material. Other products such
as distillation residues yielded ICR of too dark coloring (222-636 of the
iodimetric scale). $AlCl_3$ proved to be better than 91% H_2SO_4 . It produced
brighter ICR with a higher softening point ($\sim 120^\circ C$) and higher yields
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Production of indene cumarone ...

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(32-36%). From the light oil fraction (boiling range 166-212°C), the fractions 160-180°C and 160-200°C gave the best yields (35.8 and 39.9%, respectively) with softening points at 112.5 and 111°C, and bright coloring (35 and 35.4 of the iodimetric scale). Optimum polymerization occurred between 40 and 60°C. The process takes place in four stages: (1) Removal of phenols by alkali; (2) dehydration by H_2SO_4 ; (3) polymerization,

neutralization, and washing; (4) distilling-off of the solvent with vapor.

Asbestos resin plates, resilience 29.5-42.4 kg·cm/cm², hardness 3.04-3.62 kg/mm², water adsorption 0.55-0.89%, were produced from ICR with softening point 105-110°C by the Kiyevskiy zavod "Stroyindustriya" (Kiyev "Stroyindustriya" Plant). The plates meet the requirements of BTU (VTU).

A floor covered with such plates is being under observation now. ICR produced from petroleum is 60% cheaper than ICR from raw materials of the coal-tar chemical industry. Even with the present price for ICR, the floor with ICR plates is 40% cheaper than boarded floor, and 70% cheaper than inlaid floor (data found by the Institut novykh stroitel'nykh materialov Akademii stroitel'stva i arkhitektury SSSR (Institute of New Building Materials of the Academy of Construction and Architecture USSR)). There are 1 figure and 3 tables.

Card 2/2

RASTATURIN, V.A.

Heat transfer of a granular layer toward a tube wall in the presence of an inner heat source. Izv.vys.ucheb.zav.; khim.i khim.tekh. 4 no.1:138-141 '61. (MIRA 14:6)

1. Leningradskiy tekhnologicheskii institut imeni Lensoвета,
kafedra tekhnologii osnovnogo organicheskogo sinteza.
(Granular materials) (Heat--Transmission)

21125

S/153/61/004/001/008/009
B110/B203

11.9000

AUTHOR: Rastaturin V.A.

TITLE: Heat transfer from a granular layer to the tube walls in the presence of internal heat sources

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya tekhnologiya, v. 4, no. 1, 1961, 138 - 141

TEXT: Heterogeneous catalyses and sorption processes are being used in the industry to an ever increasing extent. Convenient calculation methods for the heat transfer in apparatus filled with granular material are required in this connection. A.R. Colburn's formula is much used:

$\alpha = 8a \cdot Z^{0.2} \cdot C_p^{0.83} \text{ Kcal/m}^2 \cdot \text{hr} \cdot ^\circ\text{C}$, where C_p - heat capacity of the gas in Kcal/kg, Z - gas viscosity in centipoise, G - weight velocity in $\text{kg/m}^2 \cdot \text{sec}$, a - coefficient dependent on D_c/D_p (D_c - diameter of the charge, D - tube diameter). Since this and similar formulas only consider the convective heat exchange but not the heat conductivity of the granular charge, incor-

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Heat transfer from a granular layer ...

Gel'perin transformed the equation for the temperature field derived for solids with internal heat sources to cylindrical coordinates, and obtained for the temperature calculation in the center of the granular layer:

$\theta = t + g \cdot R^2 / 4 \lambda_{ef} (1 + 2 \lambda_{ef} / \alpha_1 R)$, where θ = temperature in the center of the granular layer, t = temperature in the external medium, g = heat amount emitted per hour from 1 m³ of granular material, R = radius of the cylindrical tube, α_1 = coefficient of the heat transfer from the tube wall to the external medium. Unfortunately, this does not permit a calculation of the technologically important surface of heat exchange as well as the basic apparatus dimensions. It is, however, possible to transform the equation by replacing the expressions $2 \lambda_{ef} / R = \alpha_2$ (α_2 = coefficient of the heat transfer from the granular layer to the tube wall) and $1/\alpha_2 + 1/\alpha_1 = 1/K$ X

(K = total heat transfer coefficient of the system granular layer - external medium) into the generally valid Fourier-Newton equation $g = 2K(\theta - t)/R$, where $2/R$ = specific surface of the cylindrical tube. For the special case studied, the authors established the following depen-

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B110/B203

Heat transfer from a granular layer ...

a gas flow ($Re = 0 - 5000$) in a wide temperature- and pressure range. The corresponding values of λ_{of} calculated by the authors for the catalysts of many catalytic processes (NH_3 -, CH_3OH -, H_2SO_4 -syntheses) are in good agreement with the experience gained. This proves the convenience of the formula considering the variety of factors and conditions of the special case investigated. There are 11 references: 8 Soviet-bloc and 3 non-Soviet-bloc. The reference to the English language publication reads as follows: Ref. 1: A.R. Colburn, Industr. and Engng. Chem., 23, 910 (1931).

ASSOCIATION: Leningradskiy tekhnologicheskii institut im. Lensovet
Kafedra tekhnologii osnovnogo organicheskogo sinteza
(Leningrad Technological Institute imeni Lensovet, Department of Technology of Basic Organic Synthesis)

SUBMITTED: April 16, 1959

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EXCERPTA MEDICA Sec. 6 Vol. 11/8 Aug. 57

RASZEJA-WANIC B.

4936. RASZEJA-WANIC B., JASINSKI K. and SMARSZ C. I Klin. Chor. Wewn. A. M., Poznań. *O wartości leczniczej przetaczania krwi w chorobach nerek. On the therapeutical value of blood transfusions in kidney diseases POL. ARCH. MED. WEWNET. 1956, 26/8 (1225-1233) Tables 5

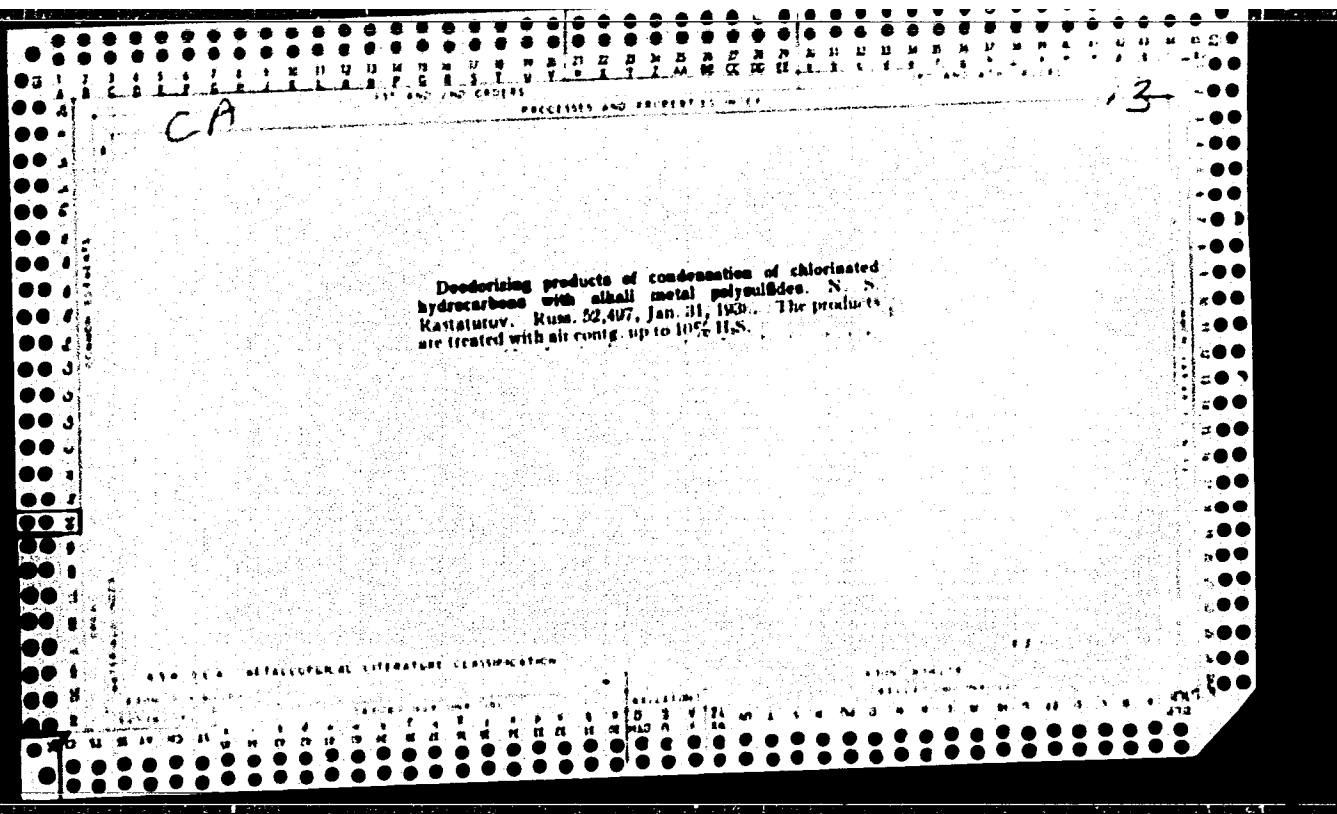
Anaemia in the course of renal failure cannot be overcome with the known therapeutic methods (liver products, iron products, vit. B₁₂, folic acid) and blood transfusion is on the whole considered not only inefficient, but harmful. On the material of 12 cases of kidney diseases with anaemia and azotaemia the authors show that this opinion is not adequately justified: (1) In acute glomerulonephritis with anaemia the transfusion of the erythrocyte suspension was a decisive therapeutic factor. (2) In chronic glomerulonephritis blood transfusion induced a short-lasting subjective improvement. (3) In amyloid nephrosis in the course of rheumatoid arthritis blood transfusion induced a considerable clinical improvement. (4) In the malignant nephrosclerosis blood transfusions did not bring about any improvement and in the author's opinion were worthless. (5) In the cases of renal failure in the course of pregnancy, in which the symptoms of azotaemia appeared after parturition, the transfusion of erythrocyte suspension induced a marked clinical improvement. In evaluating their personal material the authors were basing on a number of laboratory tests (determination of time of sodium *para*aminohippurate and sodium thio-sulphate clearance determination, of rest nitrogen, of alkali reserve, of the blood serum protein level, of the urea level etc.).

GALAKTIONOV, A.A.; SERGEYEVA, Z.V.; KURICHENKO, V.A.; RESHETNIKOVA, L.V.; POGULYAYLO, Z.K.; SUVOROV, V.S.; KRIVOV, M.D.; RASTATNIYEV, V.A.; FEDOROVA, Yu.A., red.; SAYTANIDI, L.D., tekhn. red.

[Collection of technologically groned production norms for mechanized farm work done in shifts] Sbornik tekhnicheskikh obosnovaniykh normativov smennoi proizvoditel'nosti na sel'skokhoziaistvennyye mekhanizirovannye raboty. Moskva, Izd-vo MSKh RSFSR, 1962. 231 p. (MIRA 15:9)

1. Russia (1917- R.S.F.S.R.) Ministerstvo sel'skogo khozyaystva. Tsentral'naya zonal'naya normativno-issledovatel'skaya stantsiya. 2. Tsentral'naya zonal'naya normativno-issledovatel'skaya stantsiya (for all except Fedorova, Saytanidi).

(Agricultural machinery--Production standards)



RASTEGAYEV, A.D., inzhener.

Experience in the use of scrapers in cold weather conditions. Mekh.stroi.
10 no.6:23-25 Je '53. (MLBA 6:6)

(Excavating machinery—Cold weather operation)

RASTEGAYEV K

KAMBALOV, N.; MASAULOV, I.; RASTEGAYEV, K., red.; GRIM', Ye., tekhn.red.

[Come settle in the Altai Territory] Poreseliasites' k nam, na
Altai. Barnaul, 1957. 62 p. (MIRA 11:6)

1. Altayskiy kray. Ispolnitel'nyy komitet.
(Altai Territory)

RASTEGAYEV, L., polkovnik, kand. tekhn. nauk

Practical studies. The subject "Ignition system." Tekh. i vooruzh.
no.4:26-29 Ap '64. (MIRA 17:9)

KOSENKO, B.F.; TYURKIN, B.P.; RASLEGAYEV, L.G., red.; BORSHCHEVSKAYA, S.I., red.

[Handbook on motorcycles, motor scooters and motorbikes; design, maintenance and repair] Spravochnaia kniga po mototsiklam, motorolleram i mopedam; ustroistvo, obsluzhivanie i remont. Leningrad, Lenizdat, 1965. 450 p.

(MIRA 18:7)

RASTEGAYEV, M. V.

168T55

USSR/Metals - High-Alloy Steels

Aug 50

"Nature of the Deterioration Mechanism in High-Alloy Steels During Swaging," M. V. Rastegayev, Inst of Metallurgy imeni A. A. Baykov, Acad Sci USSR

"Iz Ak Nauk SSSR, Otdel Tekh Nauk" No 8, pp 1183-1188

Describes experiments to study causes of deterioration of high-alloy steels in process of working by pressure. Finds direct cause of deterioration is phase transformation of overheated metal layers formed in process of nonuniform deformation in slipping planes. Submitted by Acad I. P. Bardin.

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RASTEGAYEV, M.V.

ANOSOV, Pavel Petrovich, 1797-1851; VOLODINA, N.I., redaktor; BARDIN, I.P., akademik, redaktor; GUDTSOV, M.T., akademik, redaktor; SAMARIN, A.M., redaktor; STARK, B.V., redaktor; PROKOSHIN, D.A., doktor tekhnicheskikh nauk, redaktor; VISHNYAKOV, D.Ya., doktor tekhnicheskikh nauk, redaktor; DAVIDENKOV, V.A., doktor tekhnicheskikh nauk, redaktor; RASTEGAYEV, M.V., kandidat tekhnicheskikh nauk, redaktor; SOROKIN, P.F., kandidat tekhnicheskikh nauk, redaktor; MURZIN, I.I., inzhener, redaktor; ASTAF'YEVA, G.A., tekhnicheskiiy redaktor

[Collected works] Sobranie sochinenii. Moskva, Izd-vo Akademii nauk SSSR, 1954, 204 p.
(MLRA 7:10)

1. Chlen-korrespondent AN SSSR (for Samarin, Stark)
(Metallurgy)

Rastageyev, M. V.

"Possibility of Working by Pressure Depending on the Uniformity of Deformation",
Issledovaniya po Zharoprochnym Splavam, Vol I, Akademii Nauk S.S.S.R., Moscow,
1956 (TA 490 AK 131, Vol I).

RASTEGAYEV, M. V.

Rastegayev, M. V., "Possibility of Processing by Pressure,
Depending on the Uniformity of Deformation."

in book Research on Heat Resistant Alloys, pub by Acad. Sci. USSR,
Moscow, 1956, 160 pp.

Inst. Metallurgy im A. A. Baykov

129-53-7-7/17

AUTHOR: Rastegayev, M. V., Candidate of Technical Sciences

TITLE: Ductility of High Temperature Alloys as a Function of the Structure and the Type of the Stress State
(Plastichnost' zharoprochnykh splavov v zavisimosti ot struktury i vida napryazhennogo sostoyaniya)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, Nr 7, pp 30-35 (USSR)

ABSTRACT: It is now known (Refs.6-8) that in the central part of the neck of a circular tensile specimen three-axial tension occurs and this phenomenon enables to detect more fully the plastic properties of alloys as a function of the structure in presence of a three-dimensional stress state. Since the plastic properties of alloys should be studied at elevated temperatures, the author considered it advisable to work out a reliable technique of high temperature tests of circular specimens under impact as well as under static loading. The device for static tensile tests must ensure the possibility of rapid hardening of the specimen after fracture for the purpose of "fixing" the structure of the metal. The device used of "fixing" the structure of the metal. The device used

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129-58-7-7/17

Ductility of High Temperature Alloys as a Function of the Structure and the Type of the Stress State

and two rods made of heat resisting alloy. The bottom rod 3 protrudes into a cylinder 4. Prior to the tensile tests the specimen is heated in the furnace to the required temperature. After fracture the lower rod together with a part of the specimen, drops into the cavity of the cylinder where it is hardened with a water jet. If the current is suitably chosen, the furnace temperature remains constant for 30 to 40 mins within $\pm 3^{\circ}\text{C}$. In the experiments a hot rolled specimen of the heat resisting alloy EI437 was fractured at 1250°C following which one part of the specimen was hardened immediately whilst the second was retrieved from the furnace after one minute and allowed to cool in air. From these, longitudinal cuts were made along the symmetry planes and the results of microscopic analysis are reproduced in the photographs, Fig.2, p.32. Fig.3 shows the changes in the micro-structure of a different alloy EYa3S which was subjected to impact tests at 1200°C . The author points out that the real picture of disruption

Card 2/3 of the specimen during impact tension is masked by new

129-58-7-7/17

Ductility of High Temperature Alloys as a Function of the Structure and the Type of the Stress State

crystals which form after deformation during the slow cooling in air; to avoid this it is necessary to "fix" by hardening the structure as formed at the instant of beginning of the deformation and at the instant of terminating the deformation. The test results obtained by means of this new method of testing for static and impact tensile stresses are graphed in Figs.4-6, p.34. The investigations have shown that the ductility of alloys which are difficult to shape during the period of deformation at elevated temperatures and in the presence of tensile stresses depends fundamentally on the shape and on the character of the distribution of the second phase in the structure forming during the process of heating (or cooling) at the instant of beginning of the deformation and not on the distribution of the second phase in the initial structure.

Card 3/3 There are 6 figures and 9 references, all of which are Soviet.

ASSOCIATION: Institut metallurgii AN SSSR imeni A. A. Baykova
(Institute of Metallurgy imeni A. A. Baykov, AS USSR)

AUTHORS: Rastegayev, M. V., Borisov, A. Ye. SOV/32-24-7-39/65

TITLE: An Apparatus for High-Temperature Impact Bending Tests of Samples of Heat-Resistant Alloys (Prisposobleniye dlya vysokotemperaturnogo ispytaniya na udarnoye rastyazheniye obraztsov iz zharoprochnykh splavov)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 7, pp. 871 - 871 (USSR)

ABSTRACT: A device for the impact bending test machine MK 30 was worked out which makes it possible to carry out simple and reliable hot-tests of the impact bending of round samples of heat-resistant high alloys; also low temperature measurements down to -194° may be carried out. The device consists of two parts, a fixed and a movable one; in the latter the sample is mounted; it may be heated in a silite furnace KO-14 to the experimental temperature together with the sample, then it is fixed in the first part and the pendulum is lowered. The broken through sample falls into a tank with running water and is quenched in order to maintain the structural properties. The main characteristic of the device is the uniform heating

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An Apparatus for High-Temperature Impact Bending Tests of Samples of Heat-Resistant Alloys

of the sample over its whole length; the sample, heated to 1200 - 1300°, maintain its temperature (after leaving the furnace) for 5 - 6 seconds. This fact secures safe results, as the whole test process does not last longer than 3 - 4 seconds. The device described has now been in use for series tests at the mentioned institute for six years.

ASSOCIATION: Institut metallurgii Akademii nauk SSSR (Institute of Metallurgy, AS USSR)

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RASTEGAYEV, M.V., kand. tekhn. nauk.

Technology of hot extrusion of heat resisting alloys.

Vest.mash. 38 no.10:54-58 0 '58.

(MIRA 11:11)

(Extrusion (Metals))

RASTEGAYEV, M.V.

Evaluating the methods of shaping metals by pressure, taking into
consideration the structural state of alloys. Kuz.-shtam.proizv.
1 no.4:10-12 Ap '59. (MIRA 12:10)
(Forging) (Metallography)

RASIEGAYEV, M.V.

PLANNING BOOK REVISIONS 207/2559

Abstracts from 2088. Institute metallurg. Research report on problems theoretical metallurgy

Abstracts from 2088. Institute metallurg. Research report on problems theoretical metallurgy

Abstracts from 2088. Institute metallurg. Research report on problems theoretical metallurgy

Abstracts from 2088. Institute metallurg. Research report on problems theoretical metallurgy

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Abstracts from 2088. Institute metallurg. Research report on problems theoretical metallurgy

Abstracts from 2088. Institute metallurg. Research report on problems theoretical metallurgy

Abstracts from 2088. Institute metallurg. Research report on problems theoretical metallurgy

Abstracts from 2088. Institute metallurg. Research report on problems theoretical metallurgy

RASTEGAYEV, M.V.

Crack formation in forging small areas of low-plasticity
alloys. Kuz.-shtam.proizv. 1 no.11:8-12 N '59.

(MIRA 13:3)

(Forgings) (Metals---Defects)

SOV/32-25-5-27/56

28(5)

AUTHOR:

Rastegayev, M. V.

TITLE:

Application of the Method of Constant High-temperature Upsetting for Determining the Resistance to Deformation (Primeneniye metoda vysokotemperaturnoy ravnomernoy osadki dlya opredeleniya soprotivleniya deformatsii)

PERIODICAL: Zavodskaya Laboratoriya, 1959, Vol 25, Nr 5, PP 595 - 597 (USSR)

ABSTRACT:

In order to obtain reliable results in connection with the experimental determination of the resistance to deformation (DR) according to the method of upsetting (U) contact friction must be reduced to a minimum. For this purpose, in the case of tests at high temperatures the method of constant deformation (tests at room temperature were already described) was applied to the present case. The shape of the samples (Fig 1) as well as the working technique are given. The method permits an (U) with greater approximation to the uniform deformation and a deformation of alloys of low plasticity without destruction (Fig 1). By means of equations (1) - (4) it is possible to compute the specific deformation work for dynamic load a_d

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Application of the Method of Constant High-temperature Upsetting for Determining the Resistance to Deformation SOV/32-25-5-27/56

as well as of (DR) for dynamic load r_d on the basis of experiments. Values are given for a_d and r_d of several plastic alloys and alloys of low plasticity (EI 435, EI 602, steel 20, EI 735, EI 766) as a function of the relative degree of (U) ϵ , obtained in the case of (U)-tests on the vertical ram at 1200° (Table). In the difficulty deformable alloy EI 766 a_d and r_d are considerably reduced at $\epsilon = 50\%$ which is considered to be due to a heat effect at high compressions. In the compression range of from 20-50% a_s and r_d are almost independent of ϵ . There are 2 figures, 1 table and 2 Soviet references.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR
(Institute of Metallurgy imeni A. A. Baykov of the Academy of Sciences of the USSR)

Card 2/2

S/122/60/000/003/008/015
A161/A130

AUTHOR: Raategayev, M.V., Candidate of Technical Sciences, Docent
TITLE: Investigation of metal defects welding-up in upsetting process
PERIODICAL: Vestnik mashinostroyeniya, no. 3, 1960, 51 - 55

TEXT: The problem of metal defects welding-up in forgings is not yet fully studied, and existing data are contradictory. The purpose of the described experiments was to find out proper conditions for welding up defects in carbon steel billets. The test metal was 30/ (30G) steel. Specimens consisted of 2.5 mm thick bushings pressed tightly into each other and on a center rod 5 mm in diameter. They were heated to 1,100°C and upset by flat end head in a 200-ton hydraulic press. The upsetting degree ϵ and the k ratio were calculated with the formulae:

$$\epsilon = \frac{H_0 - H_k}{H_0} \cdot 100\%; \quad k = \frac{D_{\text{mean}}}{H_k}$$

where H_0 and H_k are the height of the specimen before and after upsetting; D_{mean} - mean diameter between the top and bottom. Specimens were cut up and examined.

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5/122/20/000/003/008/015
A161/A130

Investigation of metal defects welding-up ...

Complete welding up was obtained at $k_{100} = 8.8$ (where 1,00 means 0D), or considerably more than stated by A. Tomlinson and I. Stringer (ref. 2: Journal of the Iron and Steel Institute, March, 1958). and at $k = 1.3$ or lower the bushings did not weld and gaps formed between them. Only the central bushings welded up at k between the minimum and maximum. It was obvious that not the upsetting degree determined the closing of cavities, which contradicts the common opinion. As it is very difficult in practice to obtain $k = 8.8$, a conical impression method is suggested (Ref. 8: M.V. Rastageyev, Sposob povysheniya plastichnosti litykh maloplastichnykh spлавov, Author's Certificate No. 100125, "Byulleten' izobretateley", no. 13, 1955). Its essence is illustrated (Fig. 4) - compressing metal in a container (2) by two conical rams (3). All bushings welded up completely in experiments with such compression, without traces of joints. Defects in billets can be welded up in containers with only 5 : 7% reduction but under considerable pressure. There are 5 figures, 2 tables and 9 references: 8 Soviet-bloc, and 1 non-Soviet-bloc. The reference to the English-language publication reads: A. Tomlinson, I.D. Stringer, Journal of the Iron and Steel Institute, March 1958.

Card 2/3

22744

S/509/60/000/007/005/014
E193/E483

188200

AUTHOR:
TITLE:

Rastegayev, M.V.

Evaluation of the Squeezing Group of Plastic Working
Operations in Relation to the Structure of Brittle
Alloys

PERIODICAL: Akademiya nauk SSSR. Institut metallurgii. Trudy, No.7.
Moscow, 1960. pp.60-64. Metallurgiya metallovedeniye,
fiziko-khimicheskiy metody issledovaniya

TEXT: Many metals and alloys, brittle at room temperature,
exhibit some degree of plasticity at high temperatures. There is
no general agreement, however, as to which of the available plastic
working processes is most suitable for hot working of brittle
materials. This, according to the present author, is due to the
fact that general conclusions have often been formed on the basis
of data relating to one type of alloy hot-worked under specific
conditions, whereas it is obvious that the behaviour of a
plastically deformed metal is bound to depend on its structure,
on the degree of non-uniformity of deformation and on other factors.
This prompted the present author to study the effect of structure
Card 1/5

It was
were
Card 1/5
mm at
(5) flat drop
a rectangular
(long) was compressed in
of the hammer and the anvil.
of the same width and thickness
experiments to eliminate the

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0

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E193/E483

Evaluation of the Squeezing ...

effect of the geometrical factor. The striking velocity of the drop hammer varied between 2.5 and 6.5 m/sec. The hot-working tests were conducted at 800 to 1200°C on specimens that had been held at the temperature for 15 min. In each series of tests, the maximum reduction in thickness ($\epsilon_{\max, \%}$), which had caused the appearance of the first crack, was determined. The results are reproduced in Fig.2, where $\epsilon_{\max, \%}$ is plotted against the test temperature (°C) of preliminarily hot-forged (graph a) and normalized (graph b) specimens; curves 1 and 4 relate to specimens forged in sections, curves 2 and 5 to flat forged specimens and curves 3 and 6 to flat rolled material; the broken curve indicates that no cracks were observed in this particular case. The effect of dispersion of the brittle phase on the hot workability of the alloy studied is clearly demonstrated by the striking difference in the plasticity of the normalized and hot-forged specimens. The relatively low plasticity of the hot-forged specimens when subjected to the forging-in-sections tests is somewhat puzzling, especially when compared with high plasticity of this material (50 to 70% reduction in area) revealed by impact

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Evaluation of the Squeezing ...

tensile tests. One possible explanation of this inconsistency is that even in lightly forged material intensive shear takes place, as a result of which a large quantity of heat is evolved which is sufficient to raise the temperature of the alloy to the point at which dissolution of the dispersed carbide phase can take place. This may lead to localized saturation and incipient melting in the zone of contact between the adjacent volumes of the material, moving relative to each other; if the state of stress is such that tensile stresses are present, fracture will occur. The following general conclusions were reached. (1) In selecting the most suitable hot-working process for a brittle material, consideration must be given to its structure at the moment at which the plastic deformation takes place. (2) Flat hot rolling or forging can be used to attain reduction of brittle alloys in which the second phase is either dissolved or present in the finely dispersed form. (3) Forging in sections can also be used in these applications on the condition that light reductions only are attained in a single operation. There are 2 figures and 10 Soviet references.

Card 4/5

Evaluation of the Squeezing ...



Fig.1.

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E193/E483

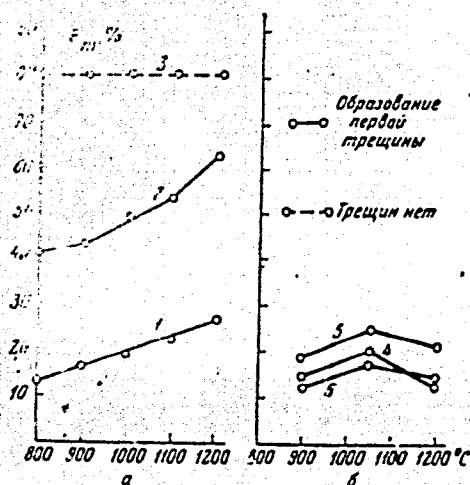


Fig.2.

BYCHKOVA, Z.S. (Moskva); VINOGRADOV, Yu.V (Moskva); DANIL'CHENKO, A.N.
(Moskva); DZUGUTOV, H.Ya. (Moskva); MEZIS, V.Ya. (Moskva); RASPEGAYEV,
M.V. (Moskva); STEFANOV, V.P. (Moskva).

Investigating the recrystallization of nickel-base heat-resistant
alloy castings. Izv. AN SSSR. Otd. tekhn. nauk. Met.1 topl. no.5:
70-78 S-O '60. (MIRA 13:11)
(Heat-resistant alloys--Metallography) (Crystallization)

1.1400

also 1454, 1496

22748
S/509/60/000/007/009/014
E193/E483

AUTHOR: Rastegayev, M.V.

TITLE: Conditions Necessary to Produce a Dense Structure During Forging

PERIODICAL: Akademiya nauk SSSR. Institut metallurgii. Trudy, No.7. Moscow, 1960. pp.83-91. Metallurgiya metallovedeniye, fiziko-khimicheskiy metody issledovaniya

TEXT: One of the side-effects of hot-forging is the elimination of the internal porosity of the metal due to closing up of the defects (voids) present in the cast ingot. If the surface of these voids is clean (oxide-free), pressure welding may take place during any hot-working operation and the defects may disappear completely with the resultant increase in the density of the metal and improvement in its mechanical properties. According to A.Tomlinson and I.D.Stringer (Ref.2: J. of the Iron and Steel Institute, March, 1958), the complete elimination of internal porosity in low-carbon steels during a hot-pressing operation is possible only if the blank is deformed in such a manner that $\frac{4}{3} K = D/H$, where D and H denote, respectively, the diameter and thickness of the blank after forging, this critical value of K Card 1/8

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Conditions Necessary to ...

being independent of the initial dimensions of the blank. On the other hand it was asserted by S.P.Larionov (Ref.1: V sv. studencheskikh nauchnykh rabot Belorusskogo politekhnicheskogo in-ta, vyp.III. Izv-vo Belgosuniversiteta, 1957) that, since a hot-pressed metal is deformed under conditions of uni-axial compression, complete elimination of internal defects cannot be ensured by hot-pressing. Since similar differences of opinion exist regarding the type and distribution of stresses (on which the welding up of internal defects ultimately depends) in a hot-pressed blank, the investigation described in the present paper was undertaken. The experimental blanks of steel 30Г (30G) were prepared by fitting tightly five concentric sleeves of progressively larger diameter (each 2.5 mm thick) onto a central cylindrical rod 5 mm in diameter. In this way, composite cylindrical test pieces (30 mm in diameter, 15 to 60 mm high) were obtained, the gaps (of unstated dimensions) between the closely fitting sleeves representing the internal defects in a cast metal. After pre-heating the blanks to 1100°C, they were axially compressed between two flat faces of a 200 t forging press. Both the
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Conditions Necessary to ...

reduction in height ($\epsilon, \%$) and the magnitude of the coefficient K were determined, the latter being calculated from the formula $K = D_{cp}/H_K$, where D_{cp} is the mean diameter of the blank after forging and H_K its thickness (D_{cp} was given by $(D_B + D_N)/2$ where D_B and D_N are the diameters of the upper and lower faces of the blank). After forging, the blanks were cut into slices 1.5 to 2 mm thick; these were polished and bent over a mandrel 20 mm in diameter to reveal whether and to what extent welding between the adjacent components of the blank had taken place. The results which are tabulated in the paper can be summarized as follows. (1) Complete welding between all the sleeves when a blank had been deformed to give $K \geq 8.8$. (2) When blanks, characterized by $1.3 < K < 8.8$, had been obtained after forging, complete welding between the innermost sleeves only was observed. (3) No welding had occurred in blanks, characterized by $K \leq 1.3$. It was inferred from these results that complete welding up of the internal defects is possible only if the entire volume of the hot-forged material is deformed under conditions of tri-axial compression which, for steel 30G forged at 1100°C , are realized if

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$K \geq 8.8$ is attained; this critical value of K (which is twice as high as that obtained by Tomlinson and Stringer) is independent of the initial dimensions of the blank and of the degree of deformation ($\epsilon, \%$). In the next paragraphs of the present paper it is shown that the final height H_K of the blank which will ensure complete welding up of the internal defects in steel 30G, press-forged at 1100°C , can be calculated from the formula

$$H_K = 1.177 \sqrt[3]{G} \text{ cm}$$

where G is the weight of the blank in kg. The results of calculations based on this formula indicate that in order completely to eliminate the internal porosity in a 50 t ingot of steel 30G, press-forged at 1100°C , a 50000 t press would be required, while the final dimensions of the forging (diameter - 434 cm, thickness - 43 cm) would, in many cases, render the subsequent press-forging operations impractical or impossible. Consequently, other more convenient methods of producing a dense structure in a forged metal are required. One Card 4/86.

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such method, suggested by the present author (Ref.8: "Byulleten' izobreteniy", 1955, No.13 (avtorskoye svidetel'stvo No.100125)), is based on the fact established in the course of the present investigation, namely that the main condition necessary to ensure complete welding up of internal defects is that the material should be deformed under conditions of tri-axial compression, the degree of deformation being of secondary importance. The method proposed comprises two stages. In the first operation, conical indentations are made in the flat faces of a cylindrical ingot which for this purpose is placed in a thick-walled container and then compressed axially between two rams with conical heads; (compare Fig.3, showing: 1 - ingot, 2 - container, 3 - rams). After this pre-treatment, the ingot is press-forged in the conventional manner to produce a flat slab. The effectiveness of this method was demonstrated by experiments on composite blanks of steel 30G; both operations were carried out at 1100°C, a 200 t press having been used to form the conical indentations. It was found that complete welding between the component sleeves was secured after total deformation corresponding to $\epsilon = 20\%$ and Card 5/8.

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Conditions Necessary to ...

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$K = 1.5$, or $\varepsilon = 60\%$ and $K = 3.7$. Moreover, better quality welds were produced by this method. This is illustrated in Fig.4, showing microsections (x100) of the weld produced in a composite blank forged by the conventional method to attain $K \leq 8.8$ (bottom) and in a similar blank forged by the "conically indented ends" method (top). Complete elimination of internal porosity can be attained after comparatively light deformations (5 to 7% reduction in height) in a closed container; however, to attain even such light reduction under these conditions, very high pressures are required. There are 4 figures, 3 tables and 8 references: 7 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English language publication reads as follows: A.Tomlinson, I.D.Stringer, J. of the Iron and Steel Institute, March, 1958.

Card 6/8

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22749

S/509/60/000/007/010/014
E111/E452

AUTHOR: Rastegayev, M.V.

TITLE: Heat Effect in Local Dynamic Deformation

PERIODICAL: Akademiya nauk SSSR. Institut metallurgii. Trudy, No.7.
Moscow, 1960. pp.92-104. Metallurgiya metallovedeniye,
fiziko-khimicheskiy metody issledovaniya

TEXT: Following original observations by D.K.Chernov,
V.P.Kravz-Tarnavskiy discovered in 1928 a line which is visible
with the naked eye on a polished section of impact-deformed steel.
This line, named after him, represents a section through the 0.1 mm
thick strip formed in the shear surface where local dynamic
deformation occurs. In 1930, N.N.Davidenkov and I.Mirolubov
showed that the hardness of the line is not less than that of
martensite obtained in ordinary hardening and proposed the
following hypothesis: when carbon steel is upset at room
temperature, friction at the shear surface raises the temperature
locally to over A_1 , producing a strip of austenite through rapid
cooling by the surrounding metal. Another hypothesis involves
local enrichment with carbon. Academician N.T.Gudtsov does not
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Heat Effect in Local ...

the lines showed that their structure is rather mixed, containing elongated pearlitic areas and a new M phase within the ferrite field in the form of threads less than 5 to 6 microns thick. The M phase is formed from pearlitic areas without any displacement of ferrite. To compare the hardness of the M phase and the other components of the line with that of martensite and other phases obtained with complete and partial hardening of the same steel through direct rapid heating, a method for rapid graded heating was developed. For this, wedge-shaped 0.5 mm thick plates of polished type 35 steel were first annealed at 1000°C to coarse pearlite in evacuated quartz capsules and then subjected to the passage of a current. In one series of experiments, the current was passed to produce fusion in the narrow part in 8 seconds and this was followed by water quenching. In the second series, a current of 480 A was passed through the specimen in running water, producing melting in hundredths of a second and rapid cooling (which corresponds to conditions in impact loading). A type TMT-3 (PMT-3) machine was adjusted to work with low loads, enabling 2 to 3 micron indentations to be made on 5 to 6 micron Card 3/5

Heat Effect in Local ...

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zones; in combination with an immersion objective, this increased the accuracy of measurement almost 3.5-fold. For the first series of experiments the rate of heating was taken to be $93^{\circ}\text{C}/\text{second}$, the temperature ($A_{\overline{11}}$) for completion of diffusional pearlite transformation 740°C (on the basis of preliminary experiments); this agrees with the theoretical estimates of N.M.Rodigin and N.I.Kidin. From this the temperatures for the other points were estimated, the plate being divided for the calculation into elements $0.05 \times 10^{-3} \text{ m}$ long, and local resistances (and hence heat evolution) being determined. Allowance was made for the effect of temperature on both resistance and specific heat. The heat evolution values obtained for 740 and 1440°C (the fusion temperature) agreed sufficiently well and use of the value enabled the temperature distribution along the specimen to be found. The heating-time values for the two temperatures, again, were sufficiently close for their average to be used, (0.043 seconds). The temperatures for the end of transformations obtained were compared with corresponding local micro-hardness values. A conclusion from detailed comparisons

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Heat Effect in Local ...

and consideration of local specimen structures, hardness and temperatures is that the central part of the Kravz-Tarnavskiy line is heated to about 1200°C through heat generated by friction at the shear surface. The author concludes that hypothesis of phase-transformation of the line published by N.N.Davidenkov and I.Mirolubov in 1930 is confirmed by the investigation. The formation of "non-needle" martensite in the line is due to the rapid heating to over A₁ followed by rapid cooling. No confirmation of the view that chemical non-uniformity of the line is due to enrichment of some parts at the expense of others was obtained in micro-volumes; it is, in fact, due to incomplete transformation of the initial phases into austenite and incomplete homogenization of the latter. There are 4 figures, 3 tables and 13 Soviet-bloc references. X

Card 5/5

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1. The first step is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

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Exercises

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WIRELESS [Cableless operation] 227
Wireless and "Cableless" Shortwave

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Journal of Differential Equations

1. **Introduction**

INVESTIGATIONS OF BUREAU OF INFORMATION

DANIL'CHENKO, A.N.; RASTEGAYEV, M.V.; MEZIS, V.Ya.; DZUGUTOV, M.Ya.; VINOGRADOV, Yu.V.

Effect of press forging on the durability and plasticity of alloys.
Issl. po zharopr. splav. 6:211-222 '60. (MIRA 13:9)
(Alloys--Metallography) (Deformations (Mechanics))

34519

S/659/61/007/000/006/044
D217/D303

18.11.50

AUTHORS: Rastegayev, M.V., Danil'chenko, A.N., Dzugutov, M.Ya.,
Bychkova, Z.S., Mezis, V.Ya., Vinogradov, Yu.V., and
Stepanov, V.P.

TITLE: Recrystallization of cast, deformation-resistant
alloys of the nichrome type

SOURCE: Akademiya nauk SSSR. Institut metallurgi. Issledova-
niya po zharoprochnym splavam, v. 7, 1961. 47 - 57

TEXT: The work was carried out under the supervision of I.M. Pav-
lova. The recrystallization of nichrome-type alloys has been stu-
died very little, since their low plasticity in the cast state ma-
kes experimenting difficult. Therefore, a new method of hot working
had to be developed, rendering upsetting without rupturing possible.
This method, in which uniform upsetting is achieved, consists of
making shallow flat grooves (0.5 - 0.8 mm) with rims of 0.5 mm
width, in the end faces of a cylindrical specimens (20 mm long and
20 mm diameter). The grooves are filled with moistened asbestos or

Card 1/3

Recrystallization of cast, ...

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D217/D303

water glass, acting as lubricants during high temperature deformation under a drop hammer or press. This enables the contact friction to be decreased to a minimum and thereby permits deformation under conditions of linear compression. The results of investigations of recrystallization processes occurring in metallic alloys on hot working by pressure, are usually presented in the form of space diagrams of recrystallization of the second order within the coordinates "temperature, grain size and degree of deformation". However, these diagrams do not represent the entire recrystallization process which includes the old crystals to a certain extent, as well as any possible intercrystalline failures and their weldability. Therefore, the regions of full and incomplete recrystallization, as well as regions of failure and weldability between the crystals, should be indicated. A nichrome type alloy ingot, made under production conditions, was used in the investigation. Since the maximum transverse diameter of the dendritic crystals of the ingot attains 10 - 13 mm, the dimensions of the specimens were increased to 30 mm diameter and 40 mm length, as against 20 x 20 mm used in the uniform upsetting method. The dimensions of the end fa-

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D217/D303

Recrystallization of cast, ...

ce grooves were increased proportionately to the new specimen dimensions. The specimen axes coincided with the longitudinal direction of the ingot. Three-dimensional recrystallization diagrams were constructed for cast nichrome type alloys by the "uniform" upsetting method, and also for cases in which the soaking time during annealing of the hot deformed metal had to be allowed for. The regions of complete recrystallization of a sound or defective structure, as well as regions of complete recrystallization of structures with welded-in defects were labelled. In all stages of hot deformation of nichrome-type alloys (in the cast or preliminarily recrystallized state) recrystallization (appearance and growth of new grains) was observed to take place. It was found that under certain conditions of hot working and appropriate cooling of forgings, a complex intercrystalline cohesion structure could be obtained in nichrome-type alloys which effectively increased their high temperature resistance. There are 6 figures, 3 tables and 12 Soviet-bloc references.

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S/509/62/000/009/004/014
D207/D308

1.1400

AUTHOR: Rastegayev, M. V.

TITLE: Mechanism of fracture during piecewise forging of alloys which are difficult to deform

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 90 - 95

TEXT: Surface cracking and fracture occurring during local forging were investigated on the alloy $\beta\beta 3C$ (EYa3S) which is difficult to deform, and on lead for the sake of comparison. The alloy was in its plastic state (attained by preliminary forging at recrystallization temperatures). The samples were in the form of strips of 15.5 x 10.32 mm (lead) or 20 x 13 mm cross-section (EYa3S). On forging with flat hammers on anvils the EYa3S samples failed in two stages: shear and fracture. In the shear stage a strong evolution of heat produced local phase changes and melting. In the second stage non-uniform tensile stresses produced fracture along the

Card 1/2

Mechanism of fracture ...

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D207/D308

molten regions. It is suggested that fracture can be avoided by forging in dies which prevent lateral spread, i.e. which ensure that the applied stresses are of hydrostatic type. There are 5 figures and 1 table.

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Card 2/2

S/509/62/000/009/005/014
D207/D308

AUTHORS: Pavlov, I. M., Rastegayev, M. V. and Falaleyeva, Z. S.
TITLE: On recrystallization and grain growth at small critical deformations
SOURCE: Akademiya nauk SSSR. Institut metallurgii. Trudy, no. 9, Moscow, 1962. Voprosy plasticheskoy deformatsii metalla, 96-104

TEXT: The available results on recrystallization of metals after deformation are contradictory mainly because non-uniform deformation usually occurring during tests complicates the physical mechanism. To avoid this complication the authors used uniform materials and M. V. Rastegayev's technique (cylindrical samples have asbestos-filled recesses in their plane ends and are compressed between plates), which produced uniform deformation. The tests were carried out on two alloys /-Abstracter's note: Compositions and designations of the alloys are not specified / which were difficult to deform. No. 1 alloy was used in the form of annealed hot-forged rods,
Card 1/2

On recrystallization and ...

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and No. 2 alloy in cast and annealed hot-forged states. Compression of cylinders (20 mm diameter and height) at 20 or 1200 - 1250°C produced deformations of 40 - 80%. It was followed by annealing at 1200 - 1250°C after the 20°C compression, and by quenching after the 1200 - 1250°C compression. Irrespective of the initial grain size (which ranged from 0.6 to 5.5 mm) and the temperature at which deformation was carried out, new grains appeared and grew at all stages of the treatments applied to the samples. When these new grains met, selective recrystallization (growth of some grains and not the others) took place. The experimental evidence does not support the hypothesis that selective recrystallization occurs at low values of the critical deformation (the deformation necessary to produce strong grain growth). Senior laboratory assistants R. F. Sharkova and V. M. Kondrat'yev took part in the experimental work. There are 5 figures.

Card 2/2

40980

S/659/62/009/000/014/030
1003/1203

AUTHORS Pavlov, I. M., Danil'chenko, A. N., Rastegayev, M. V., Mezis, B. Ya., Dzugutov, M. Ya. and Vinogradov, Yu. V.

TITLE The influence of plastic deformation during rolling on the time to failure, and on the mechanical properties of heat-resisting alloys

SOURCE Akademiya nauk SSSR. Institut metallurgii. Issledovaniya po zharoprochnym splavam v 9. 1962. Materialy Nauchnoy sessii po zharoprochnym splavam (1961 g.), 108-13

TEXT In an article published in vol. 6 of this series, the same authors (except Pavlov) concluded that the above influence should be investigated for every heat-resisting alloy individually. In the present article, a non-defined alloy designated as "Alloy B" usually used for flat forgings was investigated. As a criterion of its heat-resistance the time was taken to failure at 800°C, and its plasticity was evaluated from its shock resistance at 800°C, and at room temperature. It was concluded that the time to failure of this alloy and its mechanical properties can be increased by plastic deformation with subsequent heat-treatment. This increase is probably due to the close-packed lattice of the acicular strengthening phase. There are 3 figures.

Card 1/1

RASTEGAYEV, M.V.

Blue brittleness of carbon steel depending on the structure. Study
Inst.met. 9:193-201 '62. (MIRA 16:5)
(Steel—Brittleness)

RASTEGAYEV, M. V.

AID Nr. 987-6 11 June

WELDING INTERNAL DEFECTS IN INGOTS OF HEAT-RESISTANT ALLOYS
(USSR)

Rastegayev, M. V. Kuznechno-shtampovochnoye proizvodstvo, no. 4, Apr 1963,
19-21. S/182/63/000/004/002/004

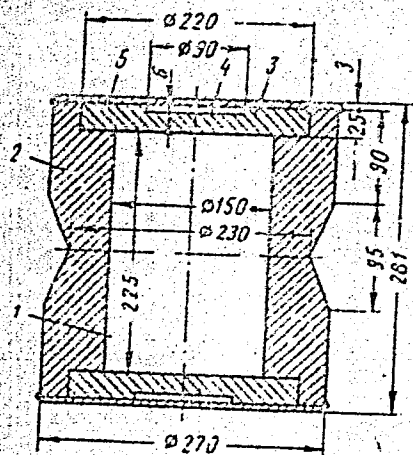
Conditions for welding shrinkage cavities and other internal defects in ingots of heat-resistant alloys by hot working have been investigated. Machined ingots of an Ni-Cr-base alloy 150 mm in diameter and 225 mm high were enclosed in heavy carbon steel envelopes [see illustration] to obtain conditions of deformation close to

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AID Nr. 987-6 11 June

WELDING INTERNAL DEFECTS (Cont.)

S/182/63/000/004/002/004



triaxial compression, heated to 1240°C, and upset in a press in two steps with reheating after the first step. With a ratio of diameter to height $D/H = 21$ the total reduction obtained was 87%; with $D/H = 9$, 78%. It was found that complete welding of non-oxidized internal defects was achieved only with a D/H ratio of 2. In stress rupture tests at 800°C under a stress of 35 kg/mm² of alloy upset with 87% reduction and either (1) annealed at 1200°C for 5 hrs, air-cooled, and aged at

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AID Nr. 987-6 11 June

WELDING INTERNAL DEFECTS [Cont'd]

S/182/63/000/004/002/004

920°C for 10 hrs or (2) annealed at 1240°C for 20 min, slowly cooled, and aged at 920°C for 10 hrs, the rupture life varied from 46 to 78 hrs for (1) and from 107 to 161 for (2). Corresponding figures for alloy upset with 78% reduction were 21 to 96 for (1) and 45 to 145 for (2). The wide scattering of the rupture-life values is attributed to incomplete welding of internal defects. [MD]

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L 10711-65 EWT(m)/EWP(k)/EWP(b) Pf-4 AFWL/ASD(m)-3/ASD(f)-2 MJW/JD/HW

ACCESSION NR: AT4009497

S/2509/63/000/014/0090/0100

AUTHOR: Pavlov, I. M.; Rastegayev, M. V.; Zharov, V. M.

TITLE: Deformation of brittle materials

SOURCE: AN SSR. institut metallurgii. Trudy*, no. 14, 1963. Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody* issledovaniya, 90-100

TOPIC TAGS: brittle material, brittle metal, brittle alloy, brittle material deformation, compression transmission medium, uniform deformation technique, deformation, hydrostatic pressure

ABSTRACT: Previous work on the plasticity of brittle materials such as rock salt, marble or sandstone suggested that significant degrees of deformation could be produced by means of high omnilateral pressure, but failed to take into consideration the effects of the rigidity of the compressing medium and the uniformity of the stress. In order to clarify the other factors affecting plasticity of such materials, the present authors carried out three series of experiments on the plastic deformation of cylindrical samples of non-plastic materials (marble, alloy steel, pig iron) under the influence of pressure applied in various ways to the faces and sides of the cylinder via compressing media which were either soft, equipliable or rigid compared to the sample. In the first series of experiments,

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L 10711-65

ACCESSION NR: AT4009497

3

compression by means of rigid facial and soft lateral pressure transmitting media (e.g., bands of steel-20 and liquid paraffin, respectively, in the case of marble samples) resulted in non-uniform deformation and cracks. In the second series, compression of a non-plastic alloy by means of equipliable facial and lateral media (bands and face-plates of alloy steel E1435) also produced non-uniform deformation, but crack formation was prevented by equilibration of the surface stresses. In the third series, the authors studied the effect of uniform deformation by means of linear compression in relation to the properties of the facial compression medium, and found that a soft facial medium resulted in longitudinal cracks; furthermore, chemical inhomogeneities produced secondary stresses and consequent microcracks (intercrystalline defects), preventing formation of a dense plastic structure. The conclusion that plastic deformation of brittle materials necessitates triaxial compression by equipliable media (as in the second series) was confirmed by successful deformation of marble samples (60-80%), and was then tested under industrial conditions in three variants (all involving omnilateral compression of alloy B by bands of steel-35): a) facial compression was by means of equipliable disks of alloy E1435; b) facial compression was by soft disks of steel-35, compressed by a 7-mm thick layer of equipliable alloy E1602; c) facial compression was by 35-mm thick disks of steel-35. Only the first variant guaranteed a high degree of plastic deformation without crack formation. Orig. art. has: 2 tables and 5 illustrations.

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L 10711-65

ACCESSION NR: AT4009497

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

SUBMITTED: 00

ENCL: 00

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NO REF SOV: 009

OTHER: 006

Card 3/3

L 45062-65 EWT(m)/EPF(n)-2/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) Pf-4/

Pu-4 IJP(c) MJW/JD/HW/JG

ACCESSION NR: AR5008958

S/0277/65/000/001/0025/0025

SOURCE: Ref. zh. Mashinostroitel'nyye materialy, konstruktsii i raschet
detaley mashin. Otd. vyp., Abs. 1.48.125

AUTHOR: Pavlov, I. M.; Danil'chenko, A. N.; Rastegayev, M. V.; Mezis, V. Ya.;
Napalkov, L. A.; Kuleshov, M. Ya.

TITLE: A study of plasticity and microstructure of VM-2 alloy when deformed
by upsetting

CITED SOURCE: Tr. Mosk. in-ta metallurgii, Mosk. energ. in-ta i Mosk. in-ta
stali i splavov vyp. 44, 1963, 256-263

TOPIC TAGS: molybdenum alloy, alloy plasticity, alloy microstructure, hot
upsetting, bulge test, optimum deformation temperature, VM-2 alloy

TRANSLATION: The report gives the results of a study of the plasticity and
microstructure of VM-2 molybdenum alloy after upsetting. The alloy's mechanical
properties at room temperature were: $\sigma_{0.2} = 27.2 - 28.0 \text{ kg/mm}^2$, $\sigma_{cr} = 37.0 -$
 41.0 kg/mm^2 , $\delta = 6-10\%$, $\psi = 5-8.5\%$. Samples with diameter $\approx 20 \text{ mm}$ were bulge-
tested on a 450 kg-m vertical impact tester with a max. ram drop rate of 10 m/
sec. Billets were annealed at 1400C prior to shaping into cylindrical samples.

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It was found that commercial grades of VM-2 alloy exhibit adequate plasticity in a pressed and annealed state. The samples were upset along the axis of symmetry to levels of 70% without the development of cracks at 800-1400C. Cracks were also absent in diameter reduction (spread) to max. deformation of 55-58% at 800 or 900C. They occurred only when upsetting at 500-700C. A comparison of effective pressure values for open and upsetting at 900-1200C has shown that this characteristic reaches levels higher by 10-40% for VM-2 alloy than for steels Kh17N2 and 30KhGSA, other conditions being equal. Deformation temperatures of 1200 to 900C are recommended in relation to alloy VM-2. Bibl. with 3 titles; 4 illustrations. G. Mekhed

SUB CODE: MM

ENCL: 00

Card 2/2

ACCESSION NR: AP4012427

S/0129/64/000/002/0009/0012

AUTHOR: Rastegayev, M.V.

TITLE: Recrystallization of hard-to-work alloy

SOURCE: Metalloved. 1 term. obrab. metallov, no. 2, 1964, 9-12,
plus insert between pp. 40-41

TOPIC TAGS: alloy, hard-to-work alloy, alloy recrystallization,
recrystallization annealing, crystallite, alloy annealing tempera-
ture

ABSTRACT: There is usually no reflection of: the degree of re-
crystallization of initial crystallites, data on temperatures of
recrystallization annealing, and extraction time in recrystalliza-
tion diagrams. It is advisable, in diagrams plotted with respect to
a uniform upset forging method, to distinguish an area of complete
or incomplete recrystallization. Plates quenched in water were used
to construct an initial recrystallization diagram without maintain-
ing the metal at recrystallization annealing temperature; second

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ACCESSION NR: AP4012427

samples were maintained at 1250C for 2 hours and were quenched in water; they were designated for the construction of a recrystallization diagram of the first type (maintaining metal at recrystallization annealing temperature). Alloy specimens for construction of recrystallization diagrams of a second type were upset forged at 1250 and 1200C with subsequent quenching in water. In this way, the specimens, like those in the construction of the first type of diagrams were cut in an axial direction into 2 different parts from which the first were extracted at deformation temperatures in order to construct recrystallization diagrams of the second type without maintenance of the metal at recrystallization annealing temperatures. In constructing the recrystallization diagram, each section was studied microscopically and the structure was photographed. Independent of original grain size and working conditions (cold and hot), recrystallization of the preparation (development and growth of new grains) is observed in all recrystallization stages. After spallation of boundaries of new grain formations, the grain increased in the order of accumulative recrystallization. There was no confirmation of the hypothesis of accumulative recrystallization of original grains at low (critical) degrees of deformation in

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L 9951-65 ENT(p)/I/ENP(b) ASD(m)-3 JD/MLK

ACCESSION NR: AT4046865

S/0000/64/000/000/0336/0341

AUTHOR: Pavlov, I.M. (Corresponding member AN SSSR); ~~Bastogarov, M.Ye.~~
 Danil'chenko, A.N.; Zharov, V.M.; Palalayeva, Z.S.; ~~Masis, V.Ya.~~; ~~Daugutov, M.Ya.~~
 Vinogradov, Yu.

TITLE: Effect of primary thermoplastic treatment on the properties of a heat resistant alloy 6 16

SOURCE: AN SSSR. Nauchnyy sovet po probleme zharoprochnykh spлавov. Issledovaniya staley i spлавov (Studies on steels and alloys). Moscow, Izd-vo Nauka, 1964, 336-341

TOPIC TAGS: thermoplastic treatment, heat resistant steel, steel upsetting, steel microsection, heat resistant alloy, strain hardening, impact toughness, stress rupture strength

ABSTRACT: Lately, many articles have been published on plastic deformation under pressure combined with thermal treatment to obtain metals of high strength. In almost all publications, the tested metal had previously undergone treatment under pressure. In the opinion of the authors of the present paper, special attention should be paid to the initial thermoplastic treatment. If the required properties are reached at this time, further treatment is unnecessary. Previously, the authors of this article investigated cast heat-resistant alloy B from an arc
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ACCESSION NR: AT4046865

furnace by upsetting, thus obtaining various structural densities and grain boundaries affecting the heat resistance of the steel. In the given paper, heat-resistant alloy B was obtained by electric slag smelting. Thus, the initial cast structure was much better than the one described in the previous paper. The B alloy is complex and has a narrow interval for thermal treatment under pressure. The ingot (diam. 150 mm, length 600 mm) was cut into three equal parts of 150x200 mm. The parts were upset as shown in Figs. 1-3 of the Enclosure. The first two parts underwent the same degree of deformation, namely 0.844. The final contact coefficient (ratio of cylinder diameter to height) at the end of compression was 17.1. For the third part, the degree of deformation was 0.85 and the final contact coefficient was 12.9. Microsections showed that all three parts had a similar dense structure. Further, all three parts were cut into 20x20x70 mm samples for measurement of the yield point and strength. The third part had the highest values, while part two had the lowest. The second part had the highest impact toughness, while part 3 had the lowest. The stress-rupture strength after 100 hours was 14 kg/mm² for part 1, 16 kg/mm² for part 2 and 20 kg/mm² for part 3, which was verified by microstructural analysis; before 30 hours, the stress-rupture strength of part 1 was higher than that of part 2. It is noted in conclusion that thermoplastic treatment leads to high quality metals and alloys. The use of electric slag smelting improves the metal structure. Improvement of mechanical

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ACCESSION NR: AT4046865

properties depends to a high degree on the correct choice of deformation procedure which still requires further investigation. Orig. art. has: 5 figures, 1 table and 5 formulas.

ASSOCIATION: none

SUBMITTED: 16 Jun 64

ENCL: 02

SUB CODE: MM

NO REF SOV: 004

OTHER: 000

Card 3/5

L 9961-65

ACCESSION NR: AT4046865

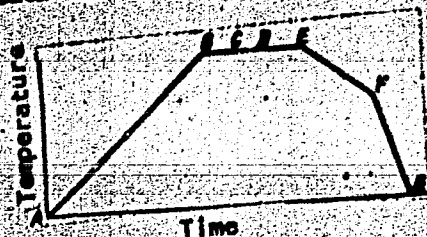


Fig. 1. Diagram of upsetting of part 1 of alloy B: AB-heating in furnace; BC-heating at given temperature; CD-upsetting in press; DE-heating in furnace; EF-slow cooling in glass wool; FG-air cooling.

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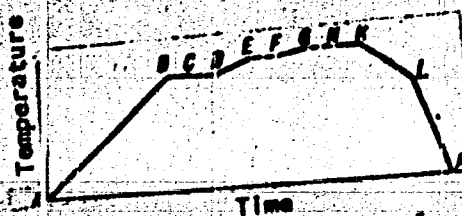


Fig. 2. Diagram of upsetting of part 2 of alloy B: AB-heating in furnace; BC-heating at given temperature; CD-upsetting in furnace; DE-second upsetting; FG-heating in furnace to temperature of G; GH-third upsetting; HK-heating in furnace to temperature of H; KL-slow cooling in glass wool; LM-air cooling.

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L 9951-65

ACCESSION NR: AT4046865

ENCLOSURE: 02

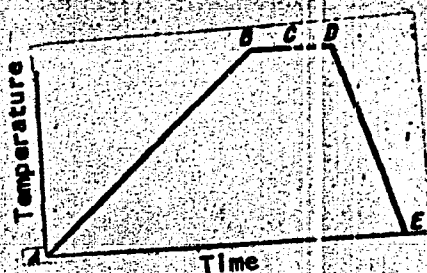


Fig. 3- Diagram of upsetting of part 3 of alloy B:
AB-heating in furnace; BC-heating at given temperature;
CD-upsetting during one stroke of press; DE-air cooling.

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L 15706-66 INT(R)/LNA(d)/EWP(t)/EWP(z)/EWP(b) LNP(c) MNP/IT/HI
 ACC NR: AP6003304 (N) SOURCE CODE: UR/0129/66/000/001/0024/0028

AUTHOR: Rastegayev, M. V.

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii) 52
 B

TITLE: Consertal structure in Ni-Cr alloy with uniform deformation
 445571 21

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 1, 1966, 24-28

TOPIC TAGS: metal grain structure, nickel containing alloy, chrome containing alloy, hot upsetting, plastic deformation, metal press / KhN77TYu Ni-Cr alloy

ABSTRACT: Specimens taken from rolled and heat-treated rods of KhN77TYu Ni-Cr alloy (0.06% C, 0.8% Si, 0.4% Mn, 0.005% S, 0.012% P, 21.2% Cr, 2.3% Ti, 0.8% Al, 0.1% Cu, 0.1% Fe) were subjected to uniform deformation by upsetting in a 200-ton hydraulic press at 900, 1000, 1100 and 1200°C with an 0-80% reduction in area, by a method described earlier (Rastegayev, M. V. Zavodskaya laboratoriya, 1959, no. 5). Prior to this the specimens were divided into two groups: those with a uniform fine-grained structure, with average grain size 0.2-0.3 mm (Group 1) and those with a consertal structure, with small 0.3 mm grains and large 3.5 mm grains (Group 2). Complete recrystallization was not observed, even after the subsequent standard heat treatment (hardening) of specimens at 1080°C and higher temperatures: this appears to be the reason for the consertal structure of specimens in Groups 1 and 2 following their

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UDC: 669.14.018.45,620.186.5

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ACC NR: AP6003304

relatively uniform deformation. A uniform fine-grained structure can be assured only if recrystallization during treatment is entirely completed by increasing the degree of deformation to $\epsilon \geq 20-25\%$, while a uniform coarse-grained structure can be assured if cumulative recrystallization comes to an end. It is assumed that the formation of coarse-grained structures in the alloy KhN77TYu is markedly affected by the thermal effect arising at sites of the localization of strains. Orig. art. has: 2 tables, 1 figure.

SUB CODE: 11, 13, 20/ SUBM DATE: none/ ORIG REF: 004/ OTH REF: 000

Cord

2/2 5/72

ACC NR: AT6034443 (A) SOURCE CODE: UR/0000/66/000/000/0109/0112

AUTHOR: Rastegayev, M. V.; Danil'chenko, A. N.; Kashin, V. I.; Zharov, V. K.; Vasyukov, G. A.

ORG: none

TITLE: Investigation of the recrystallization process in tungsten

SOURCE: AN SSSR. Institut metallurgii. Svoystva i primeneniye zharoprochnykh spлавov (Properties and application of heat resistant alloys). Moscow, Izd-vo Nauka, 1966, 109-112

TOPIC TAGS: tungsten, metal recrystallization

ABSTRACT: The subject of the investigation was vacuum melted tungsten, reduced with niobium. The tungsten billets with a diameter of 35 mm were worked down on a lathe to a diameter of 16 mm and were cut into samples with a height of 39 mm. Upsetting of the samples was done in a hydraulic press with a degree of reduction of about 40%. The first part of the samples was subjected to stepwise annealing in a vacuum furnace (vacuum 10^{-4} mm Hg) at temperatures of 1250, 1400, 1600, 1800, and 2000° for a period of 40 minutes. After each anneal, the samples were cooled in the furnace to 20°. The polished samples were then prepared and examined for degree of recrystallization. The experimental results are shown in a three dimensional diagram of the recrystallization.

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ACC NR: AP7006805

SOURCE CODE: UR/0122/66/000/012/0056/0058

AUTHOR: Rastegayev, M. V. (Candidate of technical sciences)

ORG: None

TITLE: Optimum conditions for mechanical heat treatment of KhN77TYuR alloy

SOURCE: Vestnik mashinostroyeniya, no. 12, 1966, 56-58

TOPIC TAGS: mechanical heat treatment, phase transformation, metal stamping, metal deformation

ABSTRACT: Considerable heating effects which promote phase transformations take place at points of localized deformation during pressure working of metals. The effect of this factor on grain uniformity in KhN77TYuR alloy was studied to determine optimum conditions for mechanical heat treatment which gives the alloy a uniform structure in forgings after standard heat treatment (tempering at 1080°C, holding for 8 hours and cooling in air). Large specimens with a diameter of 45 mm and a height of 62 mm and small specimens measuring 26 mm in diameter and 36 mm in height were studied. The large specimens were stamped at 1200-1000°C on a 200 ton hydraulic press while the small specimens were stamped on a 100-ton eccentric press. It was found that energy release is one of the basic factors which produces a coarse-grained structure at points of localized deformation during heat treatment of alloys of this type. Recommendations are made for eliminating or at least moderating the formation of this type

UDC: 621.78:669.15'26'295'71-194

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ACC NR: AP7006805

of structure. Stamping should be done at 1100-1150°C with a degree of deformation of at least 20% in all affected regions. The workpiece should be insulated to prevent cooling off during transportation from the furnace to the press and for a short period after completion of the deformation process. An intermediate recrystallization annealing step before cooling is advisable, the temperature and duration of the annealing depending on the given grain size. Orig. art. has: 3 figures, 1 table.

SUB CODE: 13/ SUBM DATE: None/ ORIG REF: 004
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Reel # 458

Rastegayev, M.V.

END